

the data from the SMBIOS database. Based on the Type and offset associated with the data currently being processed, the utility program accesses the corresponding information for interpreting and displaying the data from the template file. Using this information, the utility program then properly interprets and the displays the requested information concerning the computing system.

Importantly, because the information for interpreting and displaying the data stored in the SMBIOS database is removed from the source code of the utility program and placed in the template file, updates to this information is performed in the template file, as opposed to the utility program. Thus, as the SMBIOS database is updated to new major and minor versions, the utility program does not require updating. Instead all updates are performed in the template file and new versions of the template file are created. In this regard, the utility program and all versions of the template file may be stored in the computing system. The utility program will determine the version of the SMBIOS database resident in the computing system and select the corresponding template file version to interpret and display data stored in the SMBIOS database. As such, all of the computing systems within a network will use the same version of the utility program, but their utility programs will individually select the proper version of the template file to use with the corresponding version of the SMBIOS database.

In some embodiments, the apparatus of the present invention may also include an OEM template file that uses the same descriptor and control keys used in the template file. The OEM template file that includes information for interpreting and displaying additional OEM specific data structures stored in the SMBIOS database.

The apparatus and methods of the present invention are used in a computing environment to provide detailed information concerning the hardware and software components of the computing system, as well as various settings. The apparatus of the present invention includes three and sometimes four separate portions that collectively perform these functions. These portions are typically embodied in program code stored in a storage device of the computer and are run by a processor. With reference to Figure 1, the computing system 12 in which the apparatus 10 of the present invention is incorporated includes a computer-readable medium typically embodied in a storage device 14. The computer readable medium includes an SMBIOS database 16 that

includes various data structures providing information concerning the various hardware and software components of the computing system. The apparatus of the present invention also includes a utility program **18** for retrieving and displaying information from the SMBIOS database based on commands from a user of the computing system.

5 Importantly, the apparatus of the present invention also includes a template file **20** intermediary between the utility program and SMBIOS database. As will be described in greater detail below, the template file includes information for interpreting the data structures stored in the SMBIOS database, as well as information for formatting the data and text to display with the data. In some embodiments, the apparatus may further
10 include an original equipment manufacturer (OEM) template file **22** containing data for interpreting and displaying data structures added to the SMBIOS database by the OEM computing system.

As shown by data flow arrows, **24a-24c**, and the operations in Figure 2, the utility program is first commanded to retrieve data for display from the SMBIOS database **16**.
15 (See step **100**). Based on this command, the utility accesses the database and retrieves the proper data. (See step **110**). This data may be in one of several structured forms. Specifically, the data may be a raw data value, a string, a bit field, etc. To properly interpret the data structure, the utility program, using the Type and offset of the data as stored in the database, accesses the portion of the template file or OEM template file
20 containing information corresponding to the Type and offset. (See step **120**). Using the information stored in the template file, the utility program determines the information in the data structure and any formatting for displaying the data. (See step **130**). The utility program then displays the data, along with any accompanying text associated with the data to a display of the computing system and awaits a new command. (See step **140**).
25 Note that the template file includes structure definitions for Types 000-127 and the OEM template file include structure definitions for Types 128-255. Based on the Type associated with the data retrieved from the SMBIOS database, the utility program will access the appropriate template file.

As illustrated in Figure 1, the present invention provides several advantages over
30 conventional SMBIOS systems. Specifically, all of the information for interpreting and displaying data stored in data structures of the SMBIOS database is removed from the

source code of the utility program and placed in a separate template file. In this way, the data may be easily updated by merely updating the template file, as opposed to revising the utility program. Further, and importantly, because all revisions are made to the template file, a common utility program may be used for various versions of the SMBIOS database. In this regard, all possible versions of the template file corresponding to all versions of the SMBIOS database may be stored along with the utility program in the storage device of the computing system. The utility program will access the SMBIOS database in the system and determine its version. The utility program will then select the corresponding version of the template file for interpreting and displaying the data it retrieves from the SMBIOS database.

The discussion below make reference to a utility program used for retrieving and displaying data from the SMBIOS database. It further discusses interaction of the utility program with the template and OEM template file. An example of a utility program for this purpose has been developed by American Megatrends, Inc. (AMI) who is the assignee of the present application. This program is referred to in the market as SMBINFO™ and is commercially available through AMI. The SMBINFO utility program is specifically designed to operate in conjunction with the template and OEM template files to retrieve and display information stored in the SMBIOS database.

Described in detail below is the use of different descriptor and control keys in the construction of the template file and OEM template file. These keys are used to describe the various data structures stored in the SMBIOS database and provide format and text information for display of the data. The creation of data for each structure Type and field of the SMBIOS database is not illustrated below for sake of brevity. Instead, demonstrations of the use of each of the descriptor and control keys with selected data structures in the SMBIOS database will instruct one skilled in the art in creating the entire template file.

As discussed above, the SMBIOS database includes various data stored in different data structure Types defining various hardware and software settings of the computing system. The details concerning SMBIOS in general and the specifics concerning the utility program and SMBIOS database are disclosed in "System Management BIOS Reference Specification," version 2.3 (August 12, 1998) authored by